
EUROPEAN VIRTUAL N2L UNIVERSITY (EVNU) – EDUCATIONAL EXCHANGE IN NANO2LIFE – A NETWORK OF EXCELLENCE

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Introduction

Nano2Life (N2L) is a European Network of Excellence (NoE) in nanobiotechnology supported by the 6th Framework Programme of the EU. Nanobiotechnology is the field that applies the nanoscale principles and techniques to understand and transform biosystems (living or non-living) and which uses biological principles and materials to create new devices and systems integrated from the nanoscale (Roco, 2003). N2L's aim is to merge existing European expertise in the field of nanobiotechnology and its objective is to make Europe a leader in nanobiotechnology by merging existing expertise and knowledge in this field. Founded in 2004, N2L comprises 23 major European organizations within the field of nanobiotechnology. In order to accomplish its goals, N2L has more than 200 scientists presently involved in a multi faceted Joint Programme of Activity (JPA).

EVNU (European Virtual N2L University) is one of the key tasks in N2L's educational Programme and serves as an on-line educational resource designed for institutes/universities across the European Community participating in N2L. This paper provides a description of EVNU initiative and raises critical issues to consider during the development and dissemination process of EVNU, and the role it may play in the promotion of knowledge sharing across the N2L network: content, legal issues, personnel support and procedures, technical considerations, and institutional commitment.

Background

There have been numerous efforts to introduce the concept of community into educational practice. Scardamalia and Bereiter (1993) have proposed the concept of *knowledge building communities* and argued that: "If we are to support such knowledge-building discourse within the frameworks of education we need to establish the construction of knowledge as a social activity, with new ideas and information brought into the discourses of a community that shares goals for knowledge advancement and recognizes contributions" (pp. 38-39).

Learning Objects and Knowledge Repositories

Scardamalia and Bereiter (1994) have emphasized that in order to accomplish the design of *knowledge building communities* within the frameworks of education we need to develop technology that can help condense the discourse, sustain it through interruptions and across distances, and give it continuity over time. The development of knowledge building technology deliberately designed to facilitate collaborative work toward advancing shared knowledge artifacts was made possible with the researchers' conceptual foundations (Scardamalia & Bereiter, 1993).

Wiley (2000) defined a Learning Object (LO) as "any digital resource that can be reused to support learning". LOs provide a diversified learning environment on the web to both students and educators. The purpose of these items is to improve face-to-face teaching and to enable to teach online courses (Storey et al., 2002). Different types of LOs can use several types of knowledge representations, thus appealing to different students (Bannan-Ritland, Dabbagh, & Murphy, 2000; Parrish, 2004). Gibbons, Nelson, and Richards (2000) suggested discussing LOs from the following aspects: *adaptive* (to individual learners), *generative* (able to compose individually appropriate instruction) and *scalable* (able to extend to large audiences without a proportional increase in cost).

There are millions of sites on the WWW which contain material that might be useful in a class (Schell & Burns, 2002) and we use digital repositories to store, categorize and cluster the material. Digital

repositories for learning objects are considerably more complex than digital repositories in the broadest sense, both in terms of what needs to be stored and how it may be delivered (Duncan, 2003).

What makes a digital repository for learning objects much more than a portal is the ability to discover a learning object and put it to a new use. The purpose of a digital repository is not simply safe storage and delivery but sharing and reuse (Duncan, 2003). Metadata (data about data) are descriptive information about a resource (Wiley, 2000). The metadata describing the learning object are crucial to its reuse as it is only through the metadata that a learning object can be located. It is essential, therefore, that all learning objects should always use consistent metadata fields.

In recent trends, large repositories of learning objects are dedicating themselves to making learning objects from all disciplines (e.g. MERLOT, CAREO, and Wisc-online). Although this tactic offers greater access and availability, they are not always easily navigated, nor is there a uniform system for classifying them (Nash, 2005). Examples of repositories of learning objects for use in specialized training include the aviation industry and its AICC (Aviation Industry Computer-based Training Committee).

European Virtual N2L University (EVNU)

The educational work package of N2L seeks to promote a discourse on E-learning as a way to transfer key technologies and know-how in order to develop a N2L unified curriculum and study programmes. One of the key tasks in N2L's educational programme is the European Virtual N2L University (EVNU). EVNU is an on-line educational resource designed for Institutes/Universities across the European Community participating in N2L. EVNU will serve as N2L's Educational Repository, offering Learning Objects on various innovative subjects in nanobiotechnology. The educational resource will provide a diversified learning environment aiming to improve teaching and learning, making them available to researchers, lecturers and students.

EVNU's Objectives

The EVNU initiative aims to facilitate a knowledge building community involved in constructing a knowledge repository through the process of contributing learning objects in nanobiotechnology instruction in a Web-based learning environment. Its specific aims are to:

1. Promote a knowledge building community to be a joint venture among nanobiotechnology researchers and e-learning experts.
2. Enhance knowledge sharing within N2L network.
3. Facilitate the diffusion of knowledge primarily among researchers and students of higher education in the Nanobiotechnology.

The Concept

EVNU will consist of a collection of high quality Learning Objects (LOs) created to be used in a variety of educational settings - in the areas of Nanobiotechnology, stored in a user friendly web-supported Course Management System. The LOs can be the followings: video recorded lessons or full courses, synchronized presentations, textual e-content, short instructional modules, on-line educational activities, tests/questions, applets, images, computer simulations, virtual laboratories, etc.

The Meta-Data

Each Learning Object is annotated and tagged with *Meta-Data* in order to meet the academic needs of its users and to enable the selection of search criteria. The Learning Object meta-data include the following fields: Subject, Type of Learning Object (i.e. presentation, simulation, video, virtual laboratory etc.), Author/Affiliation, Intellectual Property, Pedagogical information (i.e. target audience, duration, integrating recommendations, pedagogical values, etc.), Key Words and Technical Information (i.e. macromedia flash). Each Learning Object is accompanied by a Forum serving for users' comments.

The Roles

There are different roles involved in organizing, managing and using digital repositories (Duncan, 2003). The roles EVNU supports are:

Contributor: Each participating Institute/University in N2L that is interested in contributing to EVNU Learning Objects in their unique area of research and expertise. The Learning Object can be any e-content developed by its staff for local purposes or in particular to EVNU.

Borrowers: Instructors from participating Institutes/Universities in N2L that are interested in using EVNU's Learning Objects in their academic courses as a part of their students' learning.

Casual User: Students of participating Institute/University in N2L.

The Demo

The first step towards defining the concept of EVNU was to create a Demo. The Demo consists of eight (8) LOs in a variety of subjects relating to Nanobiotechnology. The LOs were organized according to three main disciplines: Engineering, Biology and Chemistry. Each LO was annotated and tagged with Meta-Data fields as described earlier. The LOs are currently stored in *Moodle*, a course management system (CMS) for online learning. It purports to create an environment that allows for collaborative interaction among participants as a standalone or in addition to conventional classroom instruction. One of the advantages of *Moodle* is that it has been developed as an OpenSource software project. *Moodle* is a template-based system and its interface is very intuitive and allows for easy navigation. The main purpose of the Demo was to illuminate and clarify key issues to be discussed in the crystallization process of the concept of EVNU.

Preliminary Issues to be Discussed in EVNU Workshop

Currently, we aim for participants from Nano2Life institutes/universities to jointly generate the concept of EVNU and discuss key issues in the development and the dissemination process of EVNU, and the role it may play in the promotion of knowledge sharing across the N2L network:

1. *Contributors and Borrowers in EVNU*
Who is EVNU's community? What are the educational needs of our community? Who will contribute LOs to EVNU?
2. *Content organization in EVNU*
What should EVNU contain? What are the resources that can be brought to EVNU? How should the content be organized? (according to various disciplines e.g. Engineering and Biology or N2L's unified curriculum), What is a Learning Object? (granularity), What are the necessary fields in the Learning Object's Meta-Data?
3. *Design Principles*
Which shell or management system is most suitable for EVNU?
4. *Updating and maintenance*
Who should manage EVNU? To what extent should self-archiving be facilitated, or even allowed? Who will give personnel support?
5. *Dissemination of EVNU*
How can we establish/create distribution channels among N2L's members? What are the next steps to knowledge sharing within N2L network?

Concluding Remarks

Instruction in general and distance learning in particular should start with an understanding of the population to be served (Granger & Benke, 1998). European Virtual N2L University (EVNU) is a digital learning objects repository designed for institutes/universities across the European Community participating in N2L. The main outcome of EVNU workshop is an agreed foundation document summarizing the ideas developed in the workshop, defining the concept of EVNU. The final step for the establishment of EVNU is the dissemination of the widely accepted standards to all the participants

of the community (Varlamis & Apostolakis, 2006). The main ideas and issues discussed will be presented at the conference.

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